

The preimaginal instars of *Actias chapae* (MELL, 1950) (Lepidoptera: Saturniidae)

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Abstract: Larvae of *Actias chapae* (MELL, 1950) of Chinese origin (Guangdong Province, Nanling Shan) were reared for the first time to final instar on *Pinus* (Pinaceae). Although they finally did neither spin cocoons nor pupated, the incomplete life circle is shown here for the first time. These details are very interesting because they may clarify relationships to some other members of the genus. Ova and all larval instars are figured in colour as well as males from the type locality in northern Vietnam and from Hunan Province (also Nanling Shan), China, and their genitalia structures plus live males and females, including the mother of the reared material. An overview about the present knowledge of the species is given.

Keywords: China, Nanling Shan, early instars.

Die Präimaginalstadien von *Actias chapae* (MELL, 1950) aus China (Lepidoptera: Saturniidae)

Zusammenfassung: Die Raupen von *Actias chapae* (MELL, 1950) aus Guangdong, Nanling-Shan, China, wurden erstmals bis zum letzten Stadium auf Kiefer gezüchtet. Wir bilden die Präimaginalstadien hier ab, obwohl die Raupen leider im letzten Stadium eingingen, da die Zucht dieser wunderschönen Art doch einige wichtige Informationen zur Verwandtschaft innerhalb der Gattung *Actias* ergab. Eier und alle Larvalstadien, Männchen vom Typenfundort im nördlichen Vietnam und aus der Provinz Hunan (ebenfalls Nanling-Shan), China, mit ihren Genitalstrukturen sowie lebende vietnamesische und chinesische Tiere inklusive des Weibchens, das den Zuchtstamm der hier vorgestellten Raupen ergab, werden farbig abgebildet. Es wird eine Übersicht über die bisherigen Kenntnisse zu dieser seltenen Art gegeben.

Introduction

Actias chapae (MELL, 1950) was originally described in the subgenus *Argema* WALLENGREN, 1858 of the genus *Actias* LEACH in LEACH & NODDER, 1815, based on 1 ♂ and 1 ♀ from Chapa, 2000 m, in Fan Si Pan mountain area of northern Vietnam. The type series, 1 ♂ and 1 ♀ in Museum Alexander Koenig, Bonn, consists of two different species (re-examined, S.N.): The ♂ with data “Chapa (Tonkinesische Hochalpen), 1500 m, EDINGER [leg.]”; “*Actias chapae* ♂, det. ROUGEOT, Holotype?” was designated as lectotype by NÄSSIG & BRECHLIN (1995: 309), and thereby the identity of the taxon was confined to what was generally interpreted as *A. chapae* before; a lectotype label was added recently. As mentioned before by NÄSSIG & BRECHLIN, the lectotype bears no longer an abdomen, and a possible genitalia slide got lost. The ♀ paralectotype with labels “*Actias surprisans* MELL Typ.”

[handwritten, MELL]; “Chapa (Tonkinesische Hochalpen), 1500 m, EDINGER [leg.]”; “*Actias chapae* ♀ det. ROUGEOT, Allotype” and a paralectotype label added recently is a typical ♀ specimen of *Actias rhodopneuma* RÖBER, 1925.

TESTOUT (1946: 45), prior to the description of *A. chapae*, mentioned in his paper MELL’s material under the name “*Actias fansipanensis* in litteris”. He had a photo of the ♀ in his hands, and [correctly] mentioned that this should be a typical *A. rhodopneuma* (under the name of *Actias distincta* (NIEPELT, 1932), a junior subjective synonym of *A. rhodopneuma*). Obviously he was in contact with MELL whose description of *A. chapae* was delayed for several years due to World War II, being originally planned for 1943. The text of TESTOUT bears no description nor data, and the taxon is clearly mentioned as “in litteris”, so the name *Actias fansipanensis* definitively is a NOMEN NUDUM.

It took almost 50 years before further material of that taxon was found. NÄSSIG (1994: 344) in his provisional list of the Saturniidae of Vietnam states that still only the type specimens were known then. Only in 1995, NÄSSIG & BRECHLIN noted first new records of the species from Mount Fan Si Pan, northern slopes at 2350 m, Chapa environment, collected by Viktor SINIAEV in late x. 1994. In subsequent years some more singletons or small series of that rare species were collected on Mt. Fan Si Pan by the group around SINIAEV at different altitudes; in the junior author’s collection are ♂♂ from 2250 m (figured in D’ABRERA 1998: 71) and 2350 m elevation, collected in late x. and early xi. of 1994 and 1995, and a single ♀ collected at 1600 m altitude in late x. 1995. For further 5 years the type locality in northern Vietnam was the only record of that exquisite species; it was believed that it is endemic to Mt. Fan Si Pan until MORISHITA & KISHIDA (2000: 16, pl. 3) mentioned 5 ♂♂ and figured one from PR China, Guangdong province, Nanling Mountains, about 1000 km further to the northeast. Material from that place was examined and proved to be true *A. chapae*; ♂ specimens and their genitalia structures are figured here for direct comparison (Figs. 24, 25, 26, 27). Meanwhile, in another expedition, V. SINIAEV collected further Chinese material from Hunan province, also Nanling Shan, at 1500 m altitude, now in the junior author’s collection. All Chinese specimens were found between mid and end of November.

With knowledge of these data the senior author went to Nanling Mountains in xi. 2005 and was lucky to collect

¹ 14th contribution to the Saturniidae fauna of China (13th contribution: NAUMANN 2006: Notes on *Actias dubernardi* OBERTHÜR (Lepidoptera: Saturniidae), with description of the early instars. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 27 (1/2): 9–16).

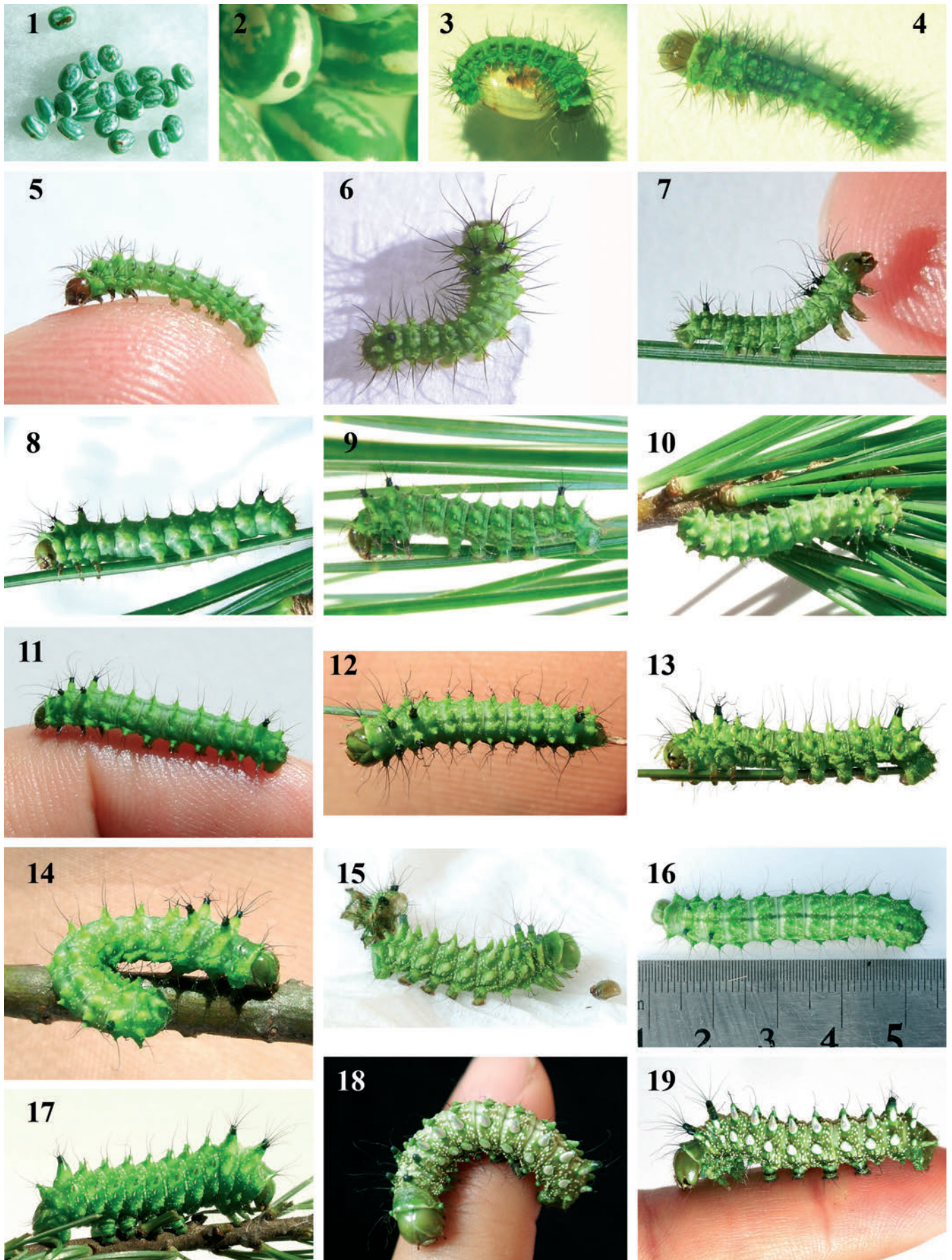


Plate 1: Preimaginal instars of *Actias chapae* from China, Nanling Mts. **Fig. 1:** Ova. **Fig. 2:** Micropyle details of ovum. **Fig. 3:** L₁, freshly hatched. **Fig. 4:** L₁ on 1st day, dorsal view. **Fig. 5:** L₁ on 5th day, lateral view. **Fig. 6:** L₂ on 2nd day, dorsal view. **Fig. 7:** L₂ on 2nd day, lateral view. **Fig. 8:** L₂ on 10th day, lateral view. **Fig. 9:** L₃ on 1st day, lateral view. **Fig. 10:** L₃ on 1st day, dorsal view. **Fig. 11:** L₃ on 4th day, lateral view. **Fig. 12:** L₄ on 2nd day, dorsal view. **Fig. 13:** L₄ on 2nd day, lateral view. **Fig. 14:** L₄ on 4th day, dorsolateral view. **Fig. 15:** L₅ on 1st day, lateral view. **Fig. 16:** L₅ on 8th day, dorsal view. **Fig. 17:** L₅ on 9th day, lateral view. **Fig. 18:** L₆ on 2nd day, dorsal view. **Fig. 19:** L₆ on 2nd day, lateral view. — Photographs: senior author.

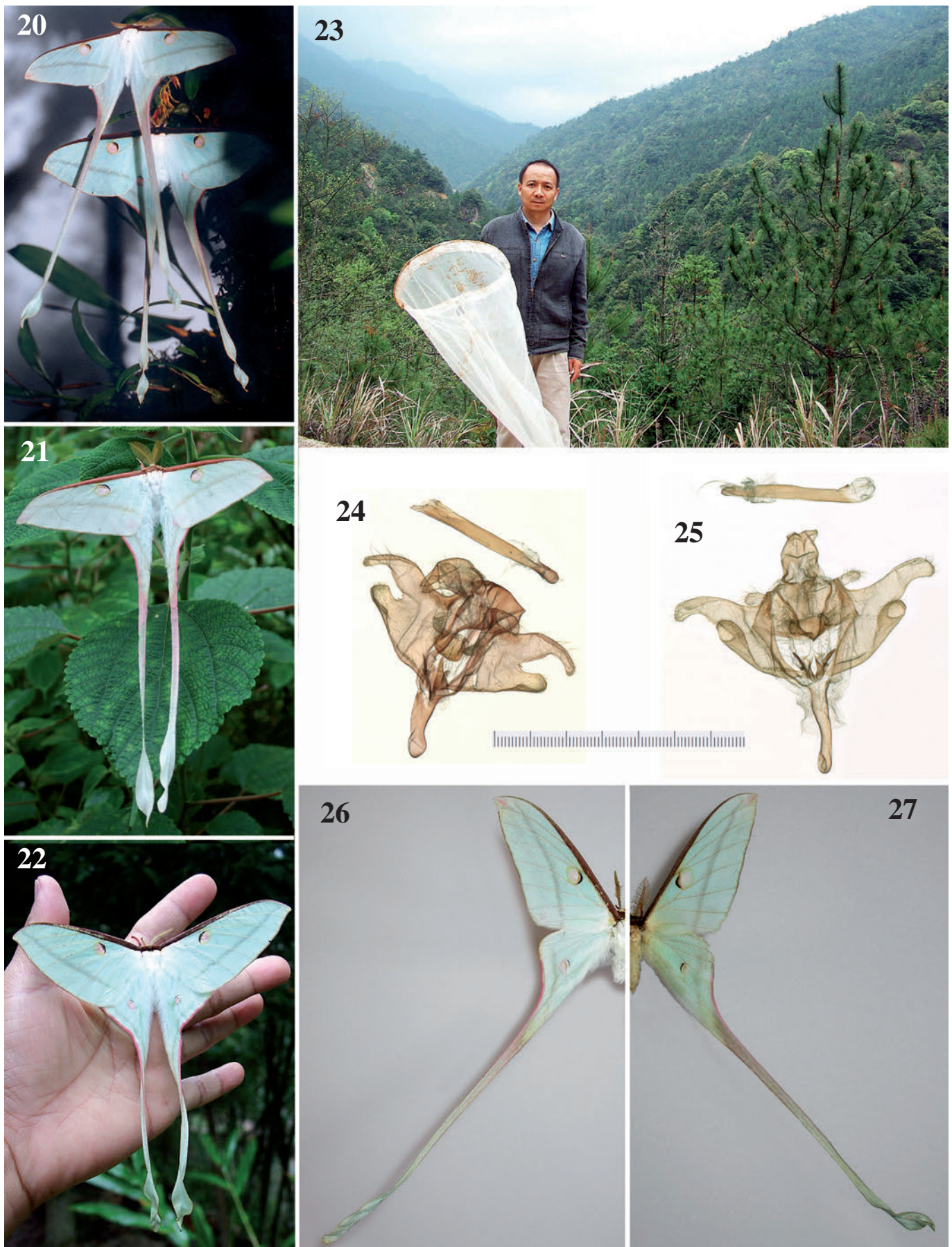


Plate 2: Adults, genitalia and habitat of *Actias chapae*: **Fig. 20:** Pair in Mt. Fan Si Pan area, Northern Vietnam. **Fig. 21:** ♂ in resting position, Nanling Shan, Guangdong, PR China. **Fig. 22:** ♀, mother of the rearing stock, Nanling Mts., Guangdong, PR China. **Fig. 23:** The senior author in the natural habitat of *A. chapae* in Nanling Shan. **Fig. 24:** ♂ genitalia structures of *A. chapae* from Guangdong, PR China, genitalia no. 980/03 Naumann. **Fig. 25:** ♂ genitalia structures of *A. chapae* from Northern Vietnam, genitalia no. 953/03 Naumann [genitalia to the same scale, scale in 0.1 mm steps]. **Fig. 26:** ♂ from Nanling Mts., Hunan, PR China, coll. S. NAUMANN. **Fig. 27:** ♂ from Mt. Fan Si Pan, Northern Vietnam, coll. S. NAUMANN. — Photographs: Fig. 20: courtesy of Viktor SINIAEV, Figs. 21–23: senior author, Figs. 24–27: junior author.

aside of 6 ♂♂ (Fig. 21) a single ♀ of *A. chapae* (Fig. 22) in late night of 20. XI., around 5:00 h, in Nanling Shan, Guangdong province, at 1100 m altitude which deposited about 80 ova. The habitat (Fig. 23) of the species was carefully examined, possible foodplants for the larvae around were found to be *Pinus massoniana* LAMB. and *Liquidambar formosana* HANCE, and the eggs were stored cool at 15°C for several weeks in Kunming. When brought back to room temperatures, larvae began hatching (about two months after oviposition), starting 23. I. 2006, and different plants were offered as food: *Pinus yunnanensis* FRANCHET, *P. resiya* ROYLE ex GORD., *P. armandii* FRANCHET, *L. formosana* and *Rhododendron* sp.; *P. massoniana* was not available in Kunming area. Finally, a few larvae accepted *Pinus*, and although most of them died fast, two of them were brought to last instar where they died before pupation. Although the pupa and cocoon remain unknown, we believe that information and photos available so far are worth to be published.

Description of the early instars

Ovum (Figs. 1, 2): flattened-ovoid, ca. 2.6 mm × 1.6 mm × 1.1 mm, of greenish ground colour with white ornamentation. On the flattened side white shadows, along the lateral rim a white equatorial band, broadest around the green micropyle. Eggs are fixed with the flattened side to the underground.

L₁ (Figs. 3–5): Freshly hatched 6 mm long, of vivid green ground colour, head capsule shining reddish brown with a diameter of 1.1 mm, thoracic legs ochreous, later turning also reddish brown. The dorsal marking between 1st and 2nd thoracic segment has a greyish shine and is turning black to the end of the first instar. Abdominal segments with dark greyish dorsolateral ornamentation. Dorsal and laterodorsal scoli with black bristles, ventrolateral with whitish ones. On 8th abdominal segment is one large fused dorsal scolus. Abdominal and anal prolegs and spiracles as well of ochreous colour.

L₂ (Figs. 6–8): Freshly moulted 7 mm long, the larva shows some differences to L₁: The head capsule is of more greenish brown colour, with a diameter of 1.5 mm, and the dorsal scoli of 1st and 2nd thoracic and 8th abdominal segment are now black, all other scoli inclusive their bases yellowish green. Now also the longest bristles of the ventrolateral abdominal scoli are of black colour. Thoracic legs now also brown, abdominal legs ochreous, later in the instar yellowish green. There is a hinted dorsal central longitudinal greyish line from head to 8th abdominal segment. Spiracles of greenish ochreous colour.

L₃ (Figs. 9–11): Freshly moulted 14 mm long, again with differences to prior instar: The head capsule of darker greenish brown colour, with a diameter of 2.1 mm. The cuticula now with more structures, such as white granules on the lateral and dorsal part which form the bases for short setae. Again the dorsal scoli of 1st and 2nd thoracic

and 8th abdominal segment are black, all others in the green ground colour. All scoli bear longer black and shorter white bristles, longest in the black scoli. The dark dorsal longitudinal band is more intensive between 1st and 2nd thoracic segment, spiracles of white colour.

L₄ (Figs. 12–14): Freshly moulted 20 mm long, again with small differences to prior instar: The head capsule of more greenish colour, of 3.0 mm diameter. The bases around and the scoli itself of more vivid green colour than earlier, thereby giving the larval cuticula a more structured surface. The general appearance in this instar is not much changed to third instar, the anterior part of the longitudinal dorsal band less intensive.

L₅ (Figs. 15–17): Freshly moulted 23 mm long, now with major changings to prior instars. The head capsule now vivid green, of 4.1 mm diameter. The formerly black dorsal scoli of 2nd and 3rd thoracic and 8th abdominal segments now of dark bluish green colour, all other tubercles again in the overall green ground colour with light bases, and, similar to e.g. larvae of *A. dubernardi* (OBERTHÜR, 1897), all dorsal and subdorsal scoli now with a silver shining lateral plate (compare NAUMANN 2006, in this volume). Thoracic, abdominal and anal prolegs of dark green colour, abdominal ones with black base, and the spiracles white as before. Intersegmental areas whitish green. The dorsal longitudinal band now more intensive, dark greyish green.

L₆ (Figs. 18, 19): Freshly moulted 36 mm long, again with some changes to appearance in 5th instar: Head capsule green with dark lateral area of stemmata, of 5.1 mm diameter. The dorsal scoli of 2nd and 3rd thoracic and 8th abdominal segments now even darker, almost bluish black, all other scoli green, and the lateral silver plates becoming now much larger, covering the complete lateral parts of the dorsal and subdorsal scoli. Ventrolateral scoli rounded, vivid green. The ground colour of the larva is now more mossy green, the whole cuticula is covered with large white granules. Spiracles light ochreous, the anal plate and prolegs brownish green, thoracic legs and abdominal prolegs green with dark markings. The last larva died three days after moulting.

Cocoon and pupa: Unknown.

Rearing data

Although not necessarily significant for the life cycle in the natural habitat, we mention here the duration for each instar. The first larvae hatched on 23. I. 2006, the different instars had following duration:

1st instar: 10 days;

2nd instar: 12 days;

3rd instar: 7 days;

4th instar: 8 days;

5th instar: 12 days;

6th instar: larvae died after three days.

Discussion

This is the first time that this exquisite species was reared at least to [most probably] final larval instar. Besides of the pine feeding European *A. isabellae* (GRAËLLS, 1849) there occurs a group of species in the genus *Actias* in which the larvae are confined to conifers. Besides *A. chapae*, this is *A. dubernardi* but also the group of less known species around *A. felicis* (OBERTHÜR, 1896), *A. kongiaria* ZHU & WANG, 1993, and *A. neidhoeferi* ONG & YU, 1968 for which a revision with description of new species will be published soon by NAUMANN et al., including description of some early instars. All those species are confined to the PR China, Taiwan, and Myanmar. As mentioned above, the full grown larvae of *A. chapae* show some similarities to those of *A. dubernardi*, but also to *A. isabellae* and the relatives of *A. felicis*, such as the silver or white spots on lateral sides of the scoli, or e.g. the white cuticular granules which obviously give the larger larvae some kind of camouflage among pine or other coniferous twigs. Also in ♂ genitalia structures *A. chapae* is closest to *A. dubernardi* with similar dorsal prolongations of the valvae, but differs by the symmetrical processes of the juxta.

From specimens of *A. chapae* collected so far it becomes clear that the species is univoltine, with adults flying in late October and November only, both at the type locality in northern Vietnam and in China, Nanling Shan. The suggestion by MELL (1950: 55) that the type material of *A. chapae* was part of a second generation obviously is wrong; he imagined that there must be another spring or summer generation which could not be confirmed although in both localities intensive collecting took place during recent years.

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